National Aeronautics and Space Administration

Roundup

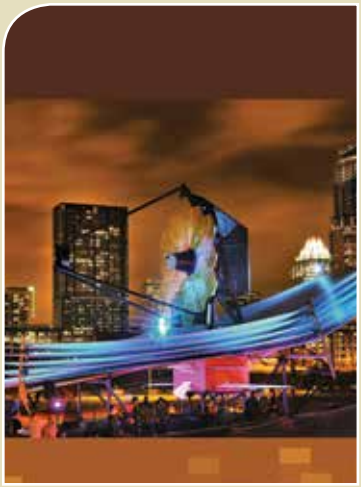
LYNDON B. JOHNSON SPACE CENTER

Spring | 2013

Fantastic Voyages

JSC Director

In this edition…



NASA/CHRIS GUNN

On the cover:

The James Webb Space Telescope will travel about 1 million miles from Earth. But, before it does, it will be tested in our own Thermal Vacuum Chamber A and newly built cleanroom surrounding it.

NASA/PHOTO

RECENTLY WE LOST ONE of our distinguished scientists, David McKay. He began his career at Johnson Space Center by training Apollo astronauts on the geology of the moon, published a seminal paper along with colleagues that presented the first evidence for life on Mars and, most recently, was studying the toxicity of lunar dust in preparation for long-term stays on the moon. We will miss David greatly, yet continue to benefit from his astonishing legacy, which reminds me of a number of reasons why I love working at JSC. I get to work among incredibly talented and committed people, people who have or are in the midst of dedicating their life's work to the exploration of space. I get to participate in an endeavor that is fascinating, challenging and important. What could be better? I get to see, firsthand, as I talk with kids and adults all around the country, how our work inspires them—bringing the spark of discovery into their lives and providing the motivation for them to set high goals for themselves in their own endeavors.

We do this in even in the midst of lots of challenges. On March 1, the law known as "sequestration" went into effect, mandating a series of automatic across-the-board cuts in total defense and non-defense discretionary spending. We know that we need to operate under the constraints of scarce resources and ongoing uncertainty.

My concept of JSC 2.0 asks a fundamental question: If we were starting JSC today, how would we build a space center to reach our vision of leading a global enterprise in human space exploration that is sustainable, affordable and benefits humankind? What expertise would need to be resident at JSC? What facilities would be required? Where else can we find expertise and facilities that could be used, and how would we collaborate? How would we be organized to most efficiently and effectively carry out our work? What tools and processes would we use? How can we be more nimble and adaptable to change, and stay that way in the future?

I hope everyone at JSC will engage in "re-inventing" JSC so that both our current programs and projects, as well as ones we hope to carry out in the future, will be successful. Focusing our energy and talent on this is the best way that we can honor the work accomplished by David and many others who came before us.

Ellen Ochoa

CREDIT: NASA/BILL INGALLS

Photo of the month:

The Orion space capsule, along with NASA astronauts Lee Morin, Alvin Drew, Kjell Lindgren, Serena Aunon, Kate Rubins and Mike Massimino, pass the presidential viewing stand and President Barack Obama during the inaugural parade on Jan. 21 in Washington, D.C.

By Lori Keith

Science setting records on International Space Station

RESEARCHERS CONTINUE to gather data for many different investigations being performed on the International Space Station (ISS). During the week of Jan. 28, a record-setting 71 hours of crew time was reached. This amount of time is like two crew members spending all their working hours on research tasks.

NASA/PHOTO ISS033-E-018536

Japan Aerospace Exploration Agency astronaut Aki Hoshide, Expedition 33 flight engineer, performs ultrasound eye imaging in the Columbus laboratory as part of the Ocular Health investigation.

The crew works on a number of investigations at any one time. This particular week included a new Earth Knowledge Acquired by Middle school students (EarthKAM) session from the Harmony module involving a record-setting 30,000 students from more than 380 school groups; checkout of the ISS SERVIR Environmental Research and Visualization System (ISERV) hardware; and installation of the Ultrasonic Background Noise Test (UBNT).

UBNT explores development of an automated leak-detection system using ultrasonic, or high frequency, noise generated by air leaking through a space structure's pressure wall. Information gleaned from this research can be used as a new approach to validate the structural integrity of pressurized systems across a broad spectrum of industries—from the station to future space-travel vessels, as well as nuclear and chemical industries using high-pressure systems and vacuum vessels.

EarthKAM and ISERV are both Earth observation and imaging investigations. EarthKAM is for educational purposes and used by classrooms globally, and ISERV is a pathfinder for automated data acquisition for monitoring, assessment and environmental decision making when needed.

One of NASA's top human spaceflight risks is the recently discovered vision degradation issues astronauts have reported. Several studies have been completed, with several more planned or already in work. From previous investigations, it appears that increased intracranial pressure (ICP) could be one of the culprits causing these issues, though other studies have supported that there may be other contributing factors. Increased ICP is caused by shifts in bodily fluids from the lower extremities to the upper part of the body due to microgravity.

Two new studies are the Ocular Health - Prospective Observational Study of Ocular Health in ISS Crews investigation and the Vision Impairment and Intracranial Pressure (VIIP) investigation. Both continue to expand research to identify the exact causes of the vision and eye structure changes astronauts are experiencing after extended stays in microgravity.

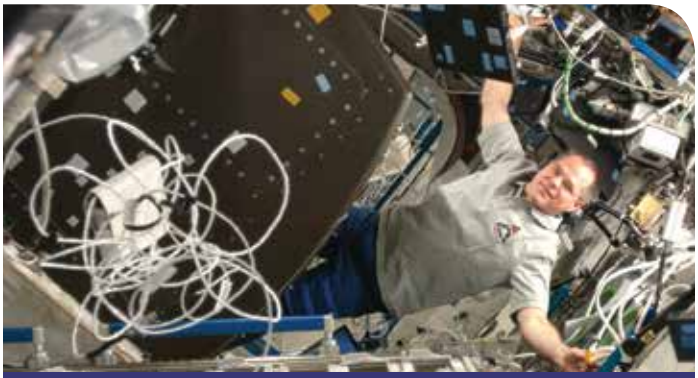
VIIP uses MRI technology to capture thin-section 3-D images taken of the study participants' brains and eye orbital areas preflight and postflight, along with health questionnaires for about 300 astronauts. Ocular Health involves doing eye ultrasounds, as well as other medical testing and monitoring, before, during and after stays in microgravity, looking for clues and correlations.

"At this point, we know spaceflight is a cause, but we don't know what it is about spaceflight that causes it," said Jennifer Fogarty, Clinical Translational scientist for the Space and Clinical Operations Division. "The fluid shift is suspected to cause alterations in blood flow (arterial and venous), causing more fluid to accumulate and ICP to rise. I think a key thing to remember is that this issue really represents spaceflight physiology."

NASA/PHOTO ISS034-E-029914

Canadian Space Agency astronaut Chris Hadfield, Expedition 34 flight engineer, prepares to set up the ISERV in the Destiny laboratory. ISERV is an off-the-shelf telescope that flies aboard the space station and deploys in the Window Observational Research Facility rack within Destiny.

There is always something interesting going on aboard your space station. To learn more about station research and technology, visit: http://www.nasa.gov/mission_pages/station/main/index.html



NASA/PHOTO ISS034-E-030218

Expedition 34 Commander Kevin Ford installs an UBNT sensor kit behind a rack in the Destiny laboratory of the International Space Station.

Training in an alien realm — here on Earth

By Mark Carreau

FOR SIX DAYS, NASA astronaut Mike Fincke and Canadian Space Agency astronaut David Saint-Jacques climbed, crawled, squeezed, waded and swam their way deep into the largely unexplored mountainous Supramonte cave network on the island of Sardinia in the Mediterranean Sea.

Joined by colleagues from Japan, Russia and Denmark, the two men were part of a September training exercise developed by the European Space Agency (ESA) to introduce them to the challenges of missions to deep space destinations.

CREDIT: ESA

"Cavenauts" get creative with cave photography to document their training exercise in the largely unexplored mountainous Supramonte cave network on the island of Sardinia.

The Cooperative Venture for Valuing and Exercising human behavior and performance Skills, or CAVES 12, combined exploration and ambitious science objectives with the isolation, risk and adjustments to cultural differences that multi-national crews can anticipate when they navigate an asteroid, Mars or a return to the moon.

"CAVES was much more like I imagined going to the moon would be like," Fincke said, who accrued 382 days and nine spacewalks on three trips to space, including a pair of lengthy expeditions to the International Space Station. He and Saint-Jacques, who is eagerly anticipating his first spaceflight, are veterans of the undersea NASA Extreme Environment Mission Operations space analog.

"What I remember most vividly feeling was that at last I'm participating in a training event that is authentic," said Saint-Jacques, a medical doctor and astrophysicist.

"This was a real international collaboration for a long duration in a strange place, with danger all around that you could mitigate with technical forethought," Saint-Jacques said. "That's how I envisage the moon, an asteroid or a Mars mission would be like. You get there in a spacecraft, you set up a camp in a strange place (and) do all these explorations while trying to conduct a rigorous science survey."

The other 2012 cavenauts included astronauts Drew Feustel of NASA; Soichi Noguchi of the Japan Aerospace Exploration Agency; Andreas Mogensen of ESA; and cosmonaut Nikolay Tikhonov of Roscosmos. Like Saint-Jacques, Mogensen and Tikhonov are preparing for their first missions.

After three days in the timeless darkness of the Sa Grutta cave, Saint-Jacques handed off command responsibilities to Mogensen, an exchange that permitted the veterans to size up their less-experienced colleagues. ESA's training team scripted some surprises involving the food supply and science protocols that Fincke and Saint-Jacques were careful to hint at, rather than reveal in detail, so they can remain an effective part of the CAVES training plans.

"Along the way, there were a couple of very space-related psychological aspects the training team gave us," Fincke said. "As a crew, we were able to talk about it. The veteran guys could give a perspective to the non-flown guys so they would not feel disappointed or go down a negative path. We ended up doing very well. We did not go down a path that could really hurt us on an operational mission."

With four days of preparation, the 2012 cavenauts made their way more than a mile into Sa Grutta to a subterranean base camp. Headlamps afforded the only illumination. Any awareness of "far away" soon faded. The temperature was a constant 59 degrees Fahrenheit; the humidity a steady 99 percent. Clothing that got wet remained uncomfortably damp, and the cavenauts packed only enough to change every other day.

(continued on page 12)

CREDIT: ESA–V. CROBU

Canadian Space Agency astronaut David Saint-Jacques holds a microbial sample in the cave during a training analog.

… and **John Cornwell** lived happily ever after—thanks to **Tim Davies** and CPR training

By Catherine Ragin Williams

THE TECHNIQUES TO SAVE A LIFE are easier than you may think. But, in an emergency situation, would you have the wherewithal to step up and do something about it?

One Johnson Space Center team member can answer that he can, because he did—and saved the life of a former JSC team member who also happens to be his next-door neighbor.

NASA ROBERT MARKOWITZ JSC2013E013774

From left to right: Mike Fox with the American Heart Association, lifesaver Tim Davies and his neighbor John Cornwell, and Barry Ponder, an AED/CPR instructor also with the American Heart Association.

On Dec. 2, 2012, John Cornwell, a retired Johnson Space Center subcontractor who had been a part of the JSC family for more than 40 years, suffered a heart attack in his front yard while raking up pine needles. Call it divine intervention, an amazing coincidence or wonderful timing … but moments earlier, Tim Davies, from JSC's Engineering Directorate, had pulled into his driveway. After exchanging some pleasantries (Davies even joking with Cornwell about his being retired and "working" on a weekend), Cornwell began to feel unwell, dizzy … and blacked out.

"We were starting to part ways when I saw him lay down," Davies recalled. "I doubled back and thought that wasn't quite right."

Immediately, Davies began performing the CPR training he had recently been refreshed on at JSC months earlier. It was yet another astonishing coincidence to add to the list, for the last time Davies had received training, it had been four years prior to that. But Davies did not hesitate to begin performing the life-saving measure, and he was able to revive Cornwell before paramedics arrived on the scene.

The saying "timing is everything" is especially apt for medical emergencies such as heart attacks. The fact that Davies was able to begin CPR right away was paramount to Cornwell's recovery.

"Every minute that you delay not placing an AED (Automated External Defibrillator) on somebody, they lose a 10 percent chance of coming back," said Barry Ponder, the American Heart Association (AHA) Community Training Center coordinator who instructed Davies for his refresher CPR training. "If you do no CPR whatsoever, by the time the ambulance gets to them, they're brain dead and there's no hope for them."

But performing CPR can be a daunting prospect to many, even though 80 percent of the time statistics show the recipient will most likely be your own family member.

"Because I'm a paramedic and ride with a 911 service, what I bring to the table (as an AED/CPR instructor) is what they're really going to see," Ponder said.

Many large companies have benchmarked their own AED/CPR programs to JSC's curriculum, which has already been taught to more than 7,000 people since the program's infancy.

"Now, we have people who don't take advantage of what is available," said Mike Fox, who implemented the AED/CPR program for JSC and is also an AHA faculty member. "Everybody has a family, and anything can happen."

At JSC, you can sign up for an AED/CPR class through SATERN.

"The good news is that the classes always fill up, and we have a new reminder system in place," said Bob Martel, JSC AED program manager with the Occupational Health Branch. "If 12 people sign up, 12 people are showing up. We have the ability to teach about 300 people a year."

Cornwell can continue to enjoy his family and friends—especially his newfound family in Davies, Davies' wife and two kids—because Davies took it upon himself to be a responsible, caring citizen.

"Not only do we wish to express our gratitude that NASA trains their employees on CPR, but to 'put a face on it,'" Cornwell said. "I survived because Tim Davies knew exactly what to do and did it quickly."

As Cornwell added, "How do you thank someone who has given you the greatest gift—a second life?"

Hopefully, it is a question that will need to be asked countless times.

With Cornwell's influence, the American Heart Association recently surprised Davies with the Heart Save Hero Award for his heroics that day in December.

JSC'S AED/CPR PROGRAM CHEAT SHEET

- The AED/CPR program is managed by JSC's Occupational Health Branch.
- To find out more about the AED/CPR program at JSC and how you can sign up for a class, visit: http://go.usa.gov/2mjh
- Want to maintain proficiency between classes? Take the interactive, Web-based "AED Challenge" at: http://sd.jsc.nasa.gov/AED/userlogin.aspx
- There are more than 80 AEDs located throughout JSC, Ellington Field, Sonny Carter Training Facility, El Paso Forward Operating Location and White Sands Test Facility. JSC also supports the AED program in Star City, Russia.
- JSC's AED/CPR program is just one part of the overall health and wellness program. Prevention is also key. Participate in Exploration Wellness at JSC: http://www.explorationwellness.com

A clean(room) slate for the James Webb Space Telescope

By Catherine Ragin Williams

PUTTING THE JAMES WEBB SPACE TELESCOPE (JWST) through its paces before it goes to space is a priority for NASA, who will be using the world's highest-performing thermal vacuum chamber of its size with Building 32's Chamber A for testing. And while the JWST needs a bone-chillingly cold place (20 Kelvin cold) to prepare for its final destination, it also needs a clean one, too.

"Virtually everything else we've done in the last few decades has gone to low-Earth orbit, and low-Earth orbit is dirty," said Mary Cerimele, project manager for the JWST Chamber Test Project. "Where James Webb is going to be is not dirty. This is really the first time we needed to have something that big, that clean."

The JWST will reside in an orbit about 1 million miles from Earth. Enter the Chamber A thermal vacuum chamber and the enormous cleanroom being built in front of it.

"People are used to coming in for tours, and they walk in and see the big chamber," Cerimele said. "Well, that view is going to be gone."

This massive cleanroom, built specifically for the JWST, will swallow almost the entire Building 32 high bay area and come right up next to Chamber B, another smaller vacuum chamber commonly used for spacesuit testing. The cleanroom, once complete, will block the familiar 90-foot-tall "soup can" appearance of Chamber A.

Before the cleanroom construction began, Chamber A had to be deconstructed and reconstructed to make sure that it would be able to support the testing required for the JWST.

"I guess the biggest challenge with that was just the magnitude of the job," said John Speed, mechanical engineer.

"Every time we dug into something—literally dug into the ground—we were pulling up … what's this wire?" Cerimele said. "Why wasn't this on a drawing? What does this pipe run?"

In addition, a deep clean was necessary to prepare it for its future cleanroom status—and that meant clearing away 50 years of accumulated grime.

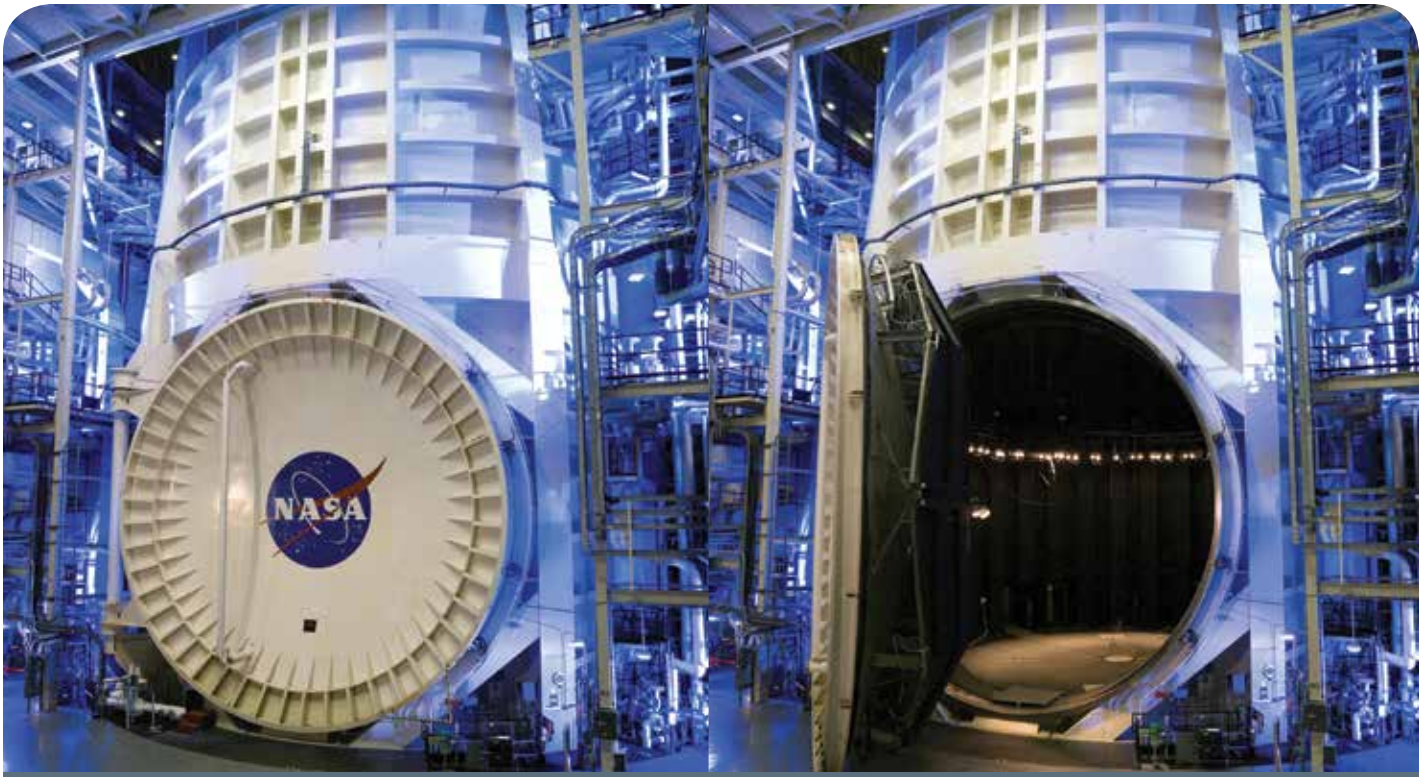
"We brought it out of the '60s and into the new millennium," Cerimele said. "One of the big changes that we made was how we flow liquid nitrogen through to the cold walls. It used to be a pump-driven system. Well, now we essentially have a siphon-fed system, which is more of an on-demand thing."

This new system translates to savings in both cost and consumables, with Chamber A requiring almost half of the liquid nitrogen needed than before.

Another improvement came with the installation of the helium shrouds in Chamber A, which brought its own unique challenges for the team to work around.

"That was the building a ship in a bottle problem," Speed said. "We did it in three sections: the ceiling, the walls and floor, and all of it had to be modeled to enough fidelity so that when you went to install it, you had some hope of it actually fitting in an existing facility."

Among the concerns was working on the infrastructure behind the existing shrouds.



NASA/PHOTO JSC2007E038357

NASA/PHOTO JSC2007E038356

A view of the 90-foot-tall Thermal Vacuum Chamber A with its massive door open and closed. This particular view will be blocked with the construction of the cleanroom being built to house the James Webb Space Telescope.

NASA/PHOTO S73-34035

The Applications Technology Satellite is deployed inside Chamber A in 1973. The JWST will undergo similar testing to ensure it can withstand the rigors of space.

"We had to hang from the ceiling of the chamber, which meant cutting through old shrouds and removing or remodeling what was behind them," Speed said. "The few surviving drawings from the '60s lended very little detailed information, which led to an almost archeological-type project of discovery. This, of course, had to happen concurrently with the design and build of the new shrouds. The shroud itself is just a skin with thermal tubes on the back, but these are so huge that you had to have enough structure behind them to actually give them some form, and the same went for the ceiling. It's a big disk, but it's 45 feet in diameter. It's not new technology, but cryogenic shroud manufacturers and their facilities were pushed to the limit here in that it's so massive."

Installing the shrouds successfully was key to the functionality of Chamber A.

"We've got tubes with gaseous helium running up and down the whole length of that wall in a very specific pattern so that it's all very uniform, and all those tubes had to be welded in together once they were in place," Cerimele said. "So once you got all those walls connected, then you've created a curtain, a shroud, of very cold surfaces to encase the test article. That is the single most important thing to getting James Webb to the conditions that it needs to be flown in. That's what got us to the 11 Kelvin."

One of the best surprises that emerged after the reconstruction of Chamber A was just how well it performed.

"I don't think anybody expected everything to work right the first time, and it did," Cerimele said. "And it didn't just work right, it worked *great*. It was really a testament, I think, to the advanced planning and the engineering and design that went into all the initial phases and all the attention to detail in the construction phase. There are 55,000 welds inside the chamber that have been there since the '60s. We added about 2,000 welds to the interior of the chamber to support all the new shrouds and piping. You would expect that when you're running something as tiny and light as helium or liquid nitrogen through all those welds, that somewhere along the line you're going to have a leak. And we didn't have a single leak, even in the welds that were 50 years old."

Baby, it's cold *inside*

So how cold does 11 Kelvin feel? Oh, it's just equivalent to a paltry -439.87 degrees Fahrenheit. Bottom line … you don't really want to know.

While Chamber A is mostly ready and waiting, the cleanroom is still being constructed. The first phase is assembling the skeleton of the cleanroom structure. This spring will see the flooring redone and the installation of a 25-ton crane for the inside of the cleanroom.

NASA/PHOTO JSC2013E017243

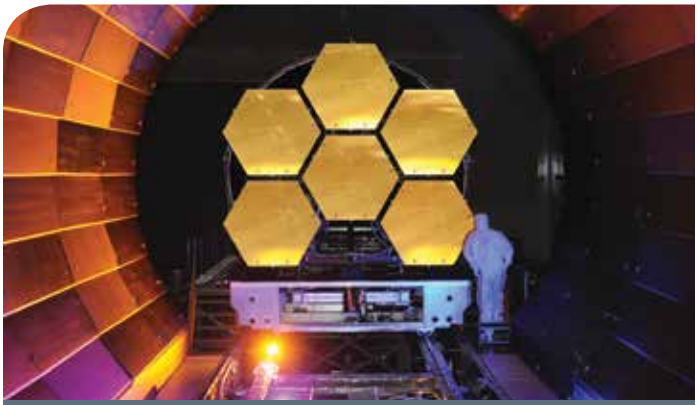
The skeletal structure of the cleanroom for the JWST is being built in front of the gigantic Thermal Vacuum Chamber A "soup can." The cleanroom's construction should be complete in September.

The next-to-last phase is the mechanical phase, "or delivering air and conditioning air and providing filtration: particulate filtration and chemical filtration. The last thing, of course, is to certify it. We're going to have to do that in concert with certifying the chamber, because when the (chamber) door is open, they're basically one volume," Speed said.

The Chamber A and its adjoining cleanroom should be ready for their time in the spotlight come September.

"We still have a marriage that has to happen here between the chamber and the cleanroom, and we're not 100 percent sure how that ceremony is going to happen yet," Speed said.

But once it does happen, the sky is not even close to the limit for the agency's most daring infrared-optimized space telescope, which launches for other worlds in 2018.



CREDIT: BALL AEROSPACE

The flight mirrors for the JWST Telescope undergo cryogenic testing at NASA Marshall Space Flight Center.

Apollo algorithm makes a star-studded reappearance for **Curiosity's** mission to Mars

By Mark Carreau

A SMALL ENGINEERING TEAM from Johnson Space Center introduced Apollo Program entry guidance procedures to NASA's Mars Science Laboratory (MSL) mission, enabling the Curiosity rover to reach the Gale Crater landing site with unmatched precision.

The dramatic Aug. 6 touchdown, cheered by the rover's Jet Propulsion Laboratory (JPL) control team and celebrated by space enthusiasts around the world, signaled a successful start to Curiosity's two-year mission.

While the rover sifts through the first soil and rock samples for evidence that Mars was once suitable for microbial life, JSC's Gavin Mendeck and Lynn Craig McGrew are already working on refinements to the venerable Apollo guidance procedures for a second robotic science rover scheduled for launching in 2020. A legacy that began with the robust programming that steered Apollo crews to mission-ending splashdowns close to their recovery ships may one day deliver human explorers to the red planet.

"We will want to land at a Mars base," said Mendeck, a Mission Operations Directorate (MOD) aerospace technologist who served as the entry guidance lead for the MSL mission. "So, a guided entry capability is critical. What we have demonstrated is that the guidance algorithm we used works pretty well at Mars."

MSL marked NASA's seventh successful Mars landing since the first of the twin Viking missions settled onto the planet in 1976. With each touchdown, the accuracy of the targeting improved.

"The work is currently ramping up," said McGrew, an MOD entry guidance analyst of the 2020 Mars rover, whose mission awaits full definition. "A lot of the same team members that worked on MSL will be working the next rover."

As Mendeck's Orion Project Entry, Decent and Landing responsibilities increase, McGrew, also of MOD, is in line to inherit the lead guidance role for the new rover and fold in some important lessons learned from Curiosity's landing.

The Martian atmosphere, though capable of providing the rover's protective entry capsule with aerodynamic lift, is much thinner than the Earth's, something the guidance algorithm must compensate for. The Martian gravity, a little more than one third the Earth's, is another challenge. Large mountains, for instance, can cause subtle differences in the gravity field.

"There is still a lot of uncertainty that we have about the density and, especially, the winds," McGrew said. "We have a pretty good sense of the global gravity field, but as we saw on Curiosity, there are localized effects."

Landing spacecraft on Mars is a challenge. Of 18 lander missions launched by the United States, Russia and the European Space Agency since 1971, only seven succeeded. All of the successes belong to the United States. Four of those followed the 1999 loss of NASA's Mars Polar Lander as it prepared to touch down.

Prior to the Polar Lander mission, NASA began to prepare for a follow-on mission initially referred to by planners as the "01 Lander," recalled Mendeck. Eager to improve landing accuracies, Mars mission planners began to look for a guidance solution. That search led to a "fly-off" competition among five guidance candidates.

Two were developed by JSC: one by the Engineering Directorate for shuttle landings, and another by MOD and the Draper Laboratory of Cambridge, Mass., for Apollo.

Claude Graves, who died in 2006 and was considered the father of shuttle entry guidance within MOD at JSC, was among those involved in the competition. Through his experiences with Apollo and his collaborations with others throughout NASA, Graves ensured the lunar mission entry algorithm was among those competing in simulations.

NASA PHOTO

The same algorithm that steered Apollo crews to mission-ending splashdowns close to their recovery ships made a reappearance with the MSL mission—and will continue to with future missions to the red planet.

"The Apollo (algorithm) had just 300 lines of code," Mendeck said. "It was consistently in the top one or two performers in almost every category. It was doing as well and, sometimes, better than others that had 10,000 lines of code. When we saw the results, it was a pretty straightforward decision."

Mendeck came to work for JSC in 2000 and joined Gilbert Carman, an MOD shuttle entry analyst who was then leading the Mars guidance effort. The "01 Lander" planning was suspended after the Polar Lander loss. Already developed "01" hardware was subsequently resurrected as the Phoenix Mars Lander, which successfully touched down in 2008.

Conceptual work for the MSL mission with an Apollo-derived guidance algorithm resumed in 2000. Mendeck took responsibility for the guidance elements in 2005, as Carman retired.

It was a homecoming of sorts for McGrew, as she and Mendeck traveled to JPL for the final two weeks of Curiosity's 8.5-month journey to Mars. McGrew

SpaceX delivers with a second cargo mission to space station

NASA PHOTO ISS034-E-062482

THIS IS ONE OF A SERIES of photos taken by the Expedition 34 crew members aboard the International Space Station during the March 3 approach, capture and docking of the SpaceX Dragon. A blue-and-white Earth and the blackness of space share the background for this image, featuring Dragon in the grasp of the Space Station Remote Manipulator System, or Canadarm2.

During the spacecraft's scheduled three-week-long stay at the orbital outpost, Dragon will deposit about 1,268 pounds of supplies to support continuing space station research experiments. The cargo craft will return about 2,668 pounds of science samples from human research, biology and biotechnology studies, physical science investigations and education activities with its splashdown off the coast of Baja California.

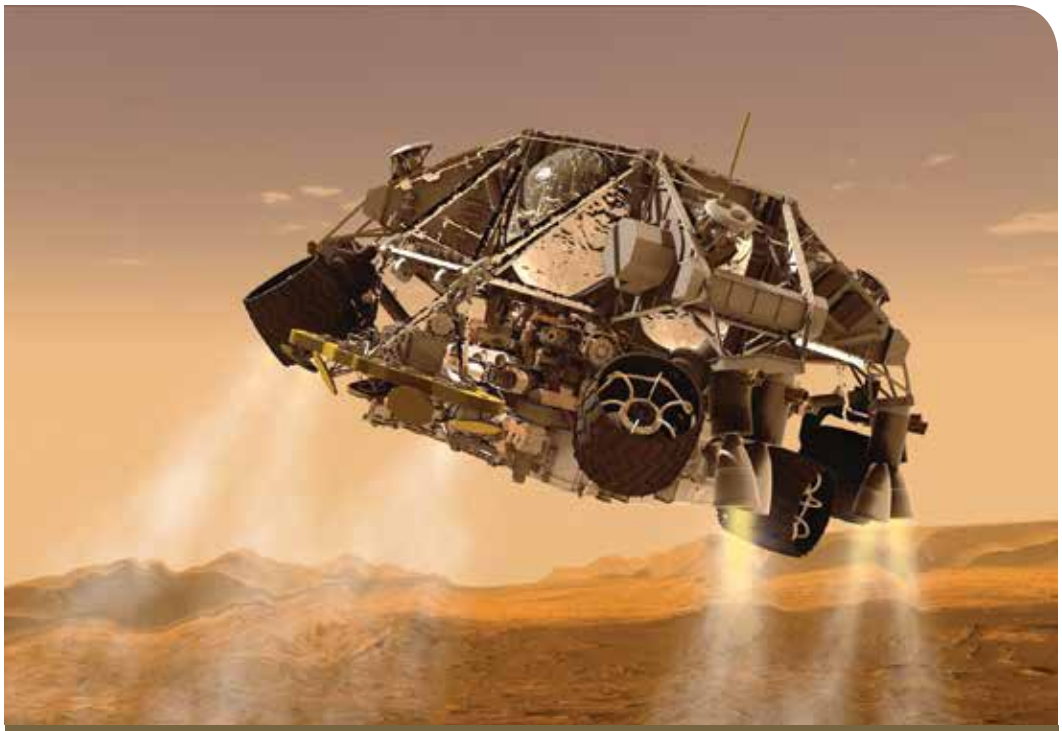
This is the second contracted resupply mission with NASA's commercial partner SpaceX.

came to work at JSC in 2010 after several years at JPL, where she worked as a trajectory analyst on the Spirit and Opportunity rovers and the Phoenix lander.

At JPL, McGrew and Mendeck were seated in a mission control support room for the much publicized "Seven Minutes of Terror" that was to herald the end of the flight. The drama began as the spacecraft reached the top of the Martian atmosphere while traveling at 13,200 mph, and ended as the sky crane lowered the rover to the floor of Gale Crater.

The Apollo heritage guided entry algorithm activated six minutes before touchdown. For nearly three minutes, the software raised and lowered Curiosity's altitude and steered through three sweeping bank reversals, with small thruster firings to keep the rover on course.

"We had a lot of confidence it would work," McGrew said. "But there are no guarantees."



NASA/JPL-CALTECH

An artist's concept of the rover and descent stage for NASA's MSL spacecraft during the final minute before Curiosity touches down on the surface of Mars.

Spotlight: **Margie Williams**

Contractor Business Analyst supporting the Office of Emergency Management
4W Solutions, Inc.

Q: Coolest part of your job at Johnson Space Center?
A: Right now, it is where I am—in Building 30 in the Emergency Operations Center. I'm involved in several projects, but I get to see the MCC-21 (Mission Control Center-21) changes, as well as help with emergency notifications and access control issues. I get to interface with lots of folks in different organizations. I view everyone as my customer and I try to provide great customer service.

Q: What was your first job at NASA like?
A: My first job was as a tour guide and it was, without question, the best job on Earth—pun intended. I started when mission control was first opened to the public for tours during missions, around May 1973. We were trained to be conversant in what was happening in the MCC, astronaut training and the benefits of space exploration. Special protocol tours allowed us to escort visitors into areas not available to the general public, like the Anechoic Chambers in Building 14 or the food labs, and we were briefed by resident experts. I have a picture I took with John Travolta when he came to NASA during the filming of "Urban Cowboy." We were just one part of the NASA family, and it was an amazing job.

Q: What personal achievement are you most proud of?
A: I worked pretty hard to get my Project Manager Professional designation. It started as something I was tasked to do, but the philosophies and the structures I learned have served me extremely well since, so I'm proud to have attained it.

Q: What would people be surprised to know about you?
A: I was a French major and I'm basically shy and retiring.

Q: If you could trade places with any other person for a week, famous or not famous, living or dead, real or fictional, who would it be?
A: This was the hardest question, since I've really never thought about the "I'd like to be …" question, but for just a week, maybe Oprah Winfrey, because she has such a positive influence on a lot of people worldwide and the means to spread that influence.

Q: What is your favorite indulgence?
A: I'm really a most anything in moderation person. I do like music and I love to sing.

Q: What survival tips do you have for those who want to work at NASA as long as you have, or even longer?
A: Get involved, collaborate and keep your mind open. In all the activities and jobs I've been involved with over the years, I always felt like I was contributing to the NASA JSC mission. I think feeling you are a part of the big picture makes you want to perform to the best of your ability—for the team.

Q: What seemingly "little things" bring you joy?
A: Grandbabies! I have three now that my sons have presented me with. My late husband had two grandchildren for whom I was grandmother, and they now have children, so I also have five great-grandchildren.

Q: What is your favorite pastime?
A: Television. I was depressed when "Monk" went off and devastated when "The Closer" ended, but have found some replacements.

Q: Describe yourself in three words.
A: Open-minded, energetic, helpful.

NASA/JAMES BLAIR JSC2013E011979

Q: When did you first become interested in space and why?
A: My dad worked at NASA in the '60s in the Transportation department. My sister was a physics intern out here during her days at Rice University. Once we landed on the moon, space was a constant part of our lives, it seems. We did spend some time convincing my grandparents and others that going to the moon was not staged.

Q: As an Occupational Safety and Health Administration Certified Safety Official, safety is a very important personal goal. What's one thing you do to promote safety?
A: I hope safety is somewhat ingrained. Now I don't see myself as "promoting" safety as much as I try to live it and set the right examples wherever I am. I do feel comfortable stopping what looks like an unsafe act, either here on-site or out in the world.

Q: What is your favorite memory at JSC or of the space program?
A: When the shuttle landed at Ellington on the back of the 747 for the first time. People came from everywhere, and it was the first time I realized I could get sunburned!

Q: JSC turned 51 in September. Where do you hope to see NASA 50 years from now?
A: I have no doubt that we will be in the "Jetson" era by then. I think we will have put boots on Mars and have orbiting laboratories, and possibly some tourist attractions up there … maybe a historical space station tour for the general public?

There's always room for Mike

THOUGH MIKE COATS is no longer Johnson Space Center's director, you can still see his friendly face if you happen to be in the Gilruth Center—specifically near the Discovery Room.

On Feb. 14, JSC Director Dr. Ellen Ochoa officially dedicated the Discovery Room to Coats for his dedication and commitment to JSC team members as center director from 2005 until 2012. Stop by, see the plaque and, while you're there, check out many of the services Starport provides for JSC team members.

NASA ROBERT MARKOWITZ JSC2013E010611

JSC Director Dr. Ellen Ochoa, with the help of former JSC Director Mike Coats, wields a giant pair of scissors to unveil the newly dedicated Discovery Room.

NASA ROBERT MARKOWITZ JSC2013E010616

Look familiar? Coats (and a plaque of Coats) greets visitors at the Gilruth Center Discovery Room on Feb. 14.

Looking forward to retirement? There is life after Johnson Space Center … the NASA Alumni League

THE NASA ALUMNI LEAGUE (NAL) was founded in 1986 after the Space Shuttle *Challenger* accident and is headquartered in Washington, D.C. The Johnson Space Center Chapter of the NAL was formed in 1989 under the leadership of former JSC Director Gerry Griffin. The JSC NAL founding group wanted local, retired NASA personnel to be available to use their talents and experience to tell NASA's story to the public, contact legislators regarding space-related issues, testify to key committees of Congress and, if called upon, perform independent assessments of space-related issues. Membership in the NAL is open to former NASA, National Advisory Committee for Aeronautics or Jet Propulsion Laboratory civil servants or military detailees.

JSC NAL membership is comprised of retired JSC civil servants who represent the many disciplines and professional levels at JSC throughout several generations of JSC programs and projects. Members are actively involved in the support of NASA's mission and activities through public promotion, education outreach, historical observances, symposiums, speakers, social networking and other special programs. They have offered advice, counsel and special resources to the agency, JSC director and programs. New members are recruited from retiring JSC employees, as the organization is always looking for new ideas, since retirees represent several generations of NASA expertise and experience.

The JSC NAL chapter has a slate of officers and Board of Directors who are expanding the chapter's base to provide better service to its primary customer—JSC retirees who are members of NAL. The 2012-2014 officers and Board of Directors are well-known JSC retirees: President Chet Vaughan; Vice President Wayne Hale; Secretary Norm Chaffee; and Treasurer Susan Braymer. Directors are Bill Bates, Larry Bell, Phil Deans, Estella Gillette, Denny Holt, Gary Johnson, Rick Nygren and E. Bob Stewart. The JSC NAL will continue to serve its almost 350 members and hold regular monthly activities, as well as periodic socials, dinners and technical symposiums on a variety of topics.

The JSC NAL serves JSC in a number of capacities. For example, members support education outreach programs at Space Center Houston and at the Challenger Center at the Houston Museum of Natural Science. In addition, JSC NAL has an agreement with the center to arrange JSC access badges for JSC NAL members. The badge is valid for the one-year period of annual membership.

For more information, visit http://www.nal-jsc.org or contact Norm Chaffee: chaffee.norman@att.net

NASA JAMES BLAIR JSC2009E120529

The JSC NAL often hosts dinners and socials for its members.

Roundup

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Training in an alien realm — here on Earth

CREDIT: ESA–V. CROBU

The cavenauts head to deeper and darker regions of the Sa Grutta caves.

(continued from page 4)

From the base camp, the cavenauts fanned out each day to explore, using climbing gear to ascend or descend rock structures. One moment they might be squeezing through a narrow crevice—the next, donning wet suits to forge a pool with water temperatures at an uncomfortable 55 degrees F. Double safety tethering was mandatory, which is the same protocol followed aboard the space station during spacewalks.

"There was an element of danger to emphasize in training the need for attention to detail," Fincke said.

The science agenda was just as authentic.

Using fragrant cheese and rotting chicken livers as bait, Fincke led the search to find and describe the timid indigenous life. The efforts paid off with the discovery of a new species of crustacean, a tiny woodlouse.

The cavenauts were exhausted but exhilarated when it was time to emerge from their alien surroundings.

"It was overwhelming," Saint-Jacques recalled. "The colors everywhere were bright and vivid. You could smell the grass from 100 yards away. (Then) within a half hour, the sensory overloads—the gains—turned down, and things appeared normal again."

CREDIT: ESA–V. CROBU

Cavenauts not only climbed rock structures, but also donned wet suits to do further exploring in the alien territory.

CREDIT: ESA–V. CROBU

The cave provided an ideal comparison to the isolation and desolate beauty that would await astronauts in other worlds.